LOOK WHO'S TALKING: A COMPARISON OF LECTURE AND GROUP DISCUSSION TEACHING STRATEGIES IN DEVELOPING CRITICAL THINKING SKILLS

Colleen Garside

This study compares the effectiveness of traditional lecture methods of instruction to group discussion methods of instruction in developing critical thinking skills. The participants in this study were 118 students enrolled in introductory interpersonal communication classes. No significant difference was found between the two instructional methods in developing critical thinking skills. However, significant gains were found from the pretest to the posttest for both instructional strategies. Specifically, the lecture method of instruction produced significant learning with regard to total score, low-level thinking items, and high-level thinking items. Group discussion, however, produced significantly more learning with regard to higher-level items. These findings indicate that face-to-face instructional methods make a significant difference in student learning.

Since the 1840s, the lecture method of instruction has been the primary method of teaching in the college classroom. It has been so pervasive that it seems obvious and natural to see a classroom of students working individually on the same task while being instructed by the teacher (Davis, 1992). In 1984, Goodlad (cited in Karmos and Karmos, 1987), after studying a thousand United States' classrooms, remarked that "teacher talk was by far the dominant classroom activity. Teachers rarely encouraged student–to–student dialogue or provided opportunities for students to work collaboratively in small groups to plan, set goals, determine alternative ways of achieving these goals, and the like. The emphasis was on recall, not on problem solving or inquiry" (p. 99). Paul (1990) criticized schools as using "out-moded didactic, lecture and drill-based models of instruction" (p. 40). As a result of this instruction, students fail to learn how to gather, analyze, synthesize, or assess information. They do not learn how to analyze the logic of questions and problems they face, and as a result, cannot adjust their thinking to them.

In an effort to meet this criticism, Oral Communication Across the Curriculum (OCXC) programs have been developed at numerous universities across the nation. These programs are founded on the premises that (a) oral communication activities will enhance communication competence, and (b) oral communication activities will enhance learning of course content. OCXC programs encourage the use of numerous oral communication activities such as presentations, debates, group discussions,

Colleen Garside (M.Ed., 1983, University of Central Oklahoma) is the Coordinator for the Speaking Excellence Across the Curriculum (SPEAC) Program and an Instructor in the Department of Communication at Weber State University. The author wishes to extend her gratitude to Larry Frey and Randy Hirokawa for their invaluable guidance and assistance in this research project. The study was conducted as part of the Faculty Mentoring Research Program sponsored by Hope College and funded by a Hemingway Faculty Vitality Grant through Weber State University. An earlier version of the paper was presented at the 1995 Speech Communication Association Convention in San Antonio.

and interactive video as teaching strategies to meet learning outcomes. These programs recognize the importance of students verbalizing material in order to internalize course concepts more effectively.

Current literature has explored the hows and whys, advantages and disadvantages, and the dos and don'ts of establishing and implementing OCXC programs (Cronin & Glenn, 1991; Cronin & Grice, 1991; Cronin & Grice, 1993; Morreale, Shockley-Zalabak & Whitney, 1993), yet there is little empirical research reported assessing whether these programs enhance the achievement of student learning outcomes (Cronin, 1993). Current research relies mostly on anecdotal evidence and self-report data from students and has been criticized as having little value in reporting communication competence and assessing learning outcomes (McCroskey, 1986; Rubin & Graham, 1988; Cronin, 1993).

As a first step in assessing these programs, it seems logical to investigate the effects of specific oral communication activities on learning outcomes–in this case, the development of critical thinking skills. Feldhusen and Treffinger (1977) indicate the need for citizens in a complex society to be good problem–solvers and critical thinkers. Research indicates that the absence of critical thinking in the decision-making process of a group will almost always result in inferior and regrettable decisions (Gouran & Hirokawa, 1983; Gouran, Hirokawa & Martz, 1986; Janis, 1982, 1989). Other scholars contend that the development of critical thinking abilities is a necessary condition for real learning to occur (Beyer, 1987; Brown, 1989; McPeck, 1981). As Paul (1990) indicates, there is a "movement in education" that "arises from an emerging new theory of knowledge, learning, and literacy which recognizes the centrality of independent critical thought to all substantial learning" (p. 41).

Group discussion is one commonly used oral communication activity within OCXC programs, applicable to almost any classroom setting. Hence, this study addresses the question, "Does group discussion facilitate the development of critical thinking skills more so than traditional lecture methods of instruction?"

To address this question, it is necessary to answer the following preliminary questions: First, what is critical thinking? Are there observable aspects or manifestations of critical thinking? How do we know when someone is thinking critically? In essence, what makes thinking critical? Second, can critical thinking be enhanced through classroom activities, and if so, how? What are the features of those activities that enhance critical thinking, and can these features be presented via classroom activities?

What Makes Thinking Critical?

Most authors agree that critical thinking involves both a set of activities or skills and a particular attitude toward thinking, learning, and decision–making (Rehner, 1994). Watson and Glaser (1939), who devised one of the earliest and most well–researched tests to assess critical thinking skills, define critical thinking in this way:

> . . . critical thinking involves a persistent effort to examine any belief or supposed form of knowledge in the light of evidence that supports it and the further conclusions to which it tends, as well as the ability to recognize problems, to weigh evidence, to comprehend and use language with accuracy and discrimination, to interpret data, to recognize the existence (or non-existence) of logical relationships between propositions, to draw warranted conclusions and generalizations and to test the conclusions by applying them to new situations to which they seem pertinent (p. 3).

In short, Watson and Glaser suggest that the crucial elements of critical thinking are the predisposition (attitude) and ability (skill) to (a) systematically and logically examine the evidence that supports various conclusions, (b) systematically and logically examine the reasoning that links evidence with conclusions, and (c) produce statements and assertions that are supported by both sound evidence and reasoning.

In the decades since Watson and Glaser's definition of critical thinking, a number of other definitions have appeared in the literature. Most of these "contemporary" definitions merely elaborate on elements of critical thinking presented in Watson and Glaser's definition. For example, Beyer (1985) characterizes critical thinking as involving "careful, precise, persistent and objective analysis of any knowledge, claim or belief in order to judge its validity and/or worth." He presents ten discrete critical thinking skills that include: (a) Distinguishing between verifiable facts and value claims; (b) determining the reliability of a source; (c) determining the factual accuracy of a statement; (d) distinguishing relevant from irrelevant information, claims or reasons; (e) detecting bias; (f) identifying unstated assumptions; (g) identifying ambiguous or equivocal claims or arguments; (h) recognizing logical inconsistencies or fallacies in a line of reasoning; (i) distinguishing between warranted or unwarranted claims; and (j) determining the strength of an argument.

More recently, Ennis (1991) defines critical thinking as "reasonable reflective thinking that is focused on deciding what to believe or do." It includes such acts as "formulating hypotheses, alternative ways of viewing a problem, questions, possible solutions, and plans for investigating something" (pp. 1–2). Ennis also identifies dispositions and abilities of the ideal critical thinker. Dispositions include such things as determining and maintaining focus on the conclusion or question, taking the whole situation into account, seeking and offering reasons, being well informed, looking for alternatives, and withholding judgment when evidence and reasons are insufficient. Abilities include such things as analyzing arguments, judging credibility of sources, identifying the focus of issues, and answering and asking questions of clarification and/or challenge. Moreover, Ennis maintains that critical thinking skills are teachable, and can form a kind of taxonomy of problem-solving skills.

Beyer (1987) indicates that critical thinking has many definitions, and can also refer to the skills drawn from Bloom's Taxonomy. Bloom's (1974) taxonomy identifies higher order thinking skills that presuppose the use of basic critical thinking concepts. It gives helpful insights into cognitive processes and their interrelations. In this view, higher order skills include analysis, synthesis and evaluation, all of which involve critical thinking skills such as analysis of elements, arguments, relevancy of issues, implications of information, and drawing logical conclusions. The theory indicates that those students who do the best analyses, syntheses, and evaluations tend to do them mindfully with a clear sense of purpose. While the taxonomy itself is organized into a one-way hierarchy, the categories are hardly mutually exclusive. Rather, there is an element of interdependence since gaining knowledge is, in fact, a complex achievement involving thought, and should be understood as the product of rational thought processes, rather than just recall. Keeping Bloom's taxonomy in mind, rational learning is a process, not a product. And this process involves comprehension, application, analysis, synthesis, and evaluation of information–all of which involve critical thinking skills. Further,

Stiggins, Rubel, and Quellmalz (1990) suggest that the key to success in measuring and teaching thinking skills is to adopt a taxonomy of skills and use it consistently. This lends credence to viewing Bloom's taxonomy as a way to model critical thinking in the classroom.

Many definitions of critical thinking have been proposed in the extant literature. Paul (1990) argues that this plurality of definitions is not necessarily problematic, and in fact, is advantageous because it helps us maintain insights into alternative perspectives and helps us escape the limitations of separate definitions. Nonetheless, the literature suggests at least four defining aspects of thinking that make it *critical:* (a) Thinking that is clear, precise, accurate, relevant, logical, and consistent; (b) thinking that reflects a controlled sense of skepticism or disbelief of any assertion, claim, or conclusion until sufficient evidence and reasoning is provided to conclusively support it; (c) thinking that takes stock of existing information and identifies holes and weaknesses, thereby certifying what we know and don't know; and (d) thinking that is free from bias, prejudice, and one-sidedness of thought.

In summary, current views hold that critical thinking includes a set of skills that are most effectively taught within the context of a subject area. Since it is impossible to think critically about something of which one knows nothing, critical thinking is dependent on a sufficient base of knowledge. The critical thinker engages the material, the instructor, and other students in an active way in a "dynamic process of raising and pursuing questions about their own and others' claims and conclusions, definitions and evidence, beliefs and reactions" (Maryland State Department of Education, 1990, pp. 17–18).

Assuming that critical thinking can be enhanced through classroom activities, what are the features of those activities that enhance critical thinking? How can these features be presented via classroom activities?

Features of Critical Thinking Activities

The key to developing critical thinking lies in creating conditions for participation rather than passivity, and in providing opportunities for the emotional engagement with the materials (Mayer, 1986). Students need to become active learners rather than passive recipients of information, taking responsibility for their own thinking and learning (Kruse, 1988; Maryland State Department of Education, 1990). McPeck (1990) suggests that teachers need to change their methods of presentation from a didactic mode to a more discursive or argumentative mode of teaching and assessment in order to emphasize critical thinking skills. Students need to elaborate, defend, and extend their positions, opinions, and beliefs. They think more deeply when they investigate the paths thinking takes on the way to a conclusion. They also recognize the arguments underlying the positions others hold (Maryland State Department of Education, 1990). Teaching for critical thinking stresses meaningful, purposeful learning, not rote memorization. To the extent that associations can be made between ideas, the more meaningful the learning will be. In essence, the more associations that can be made, the more meaningful the idea (Eggen & Kauchak, 1988).

Bozik (1987) cites Neve (1986) as offering seven strategies for creating a classroom which is "brain compatible" and "far removed from the standard teacher-talking-at-passive-group model." These strategies include: (a) Create a nonthreatening climate;

(b) provide a huge amount of input; (c) emphasize genuine communication; (d) provide for much manipulation; (e) emphasize reality; (f) address learning activities to actual, productive uses; and (g) respect natural thinking (p. 6).

Beyer (1987) likewise describes classrooms that reinforce and support thinking: Students feel free to risk, challenge, and question; there is student–to–student interaction focused on information processing, where students consider the ideas, contributions, and arguments of peers; teachers don't "tell," rather, they help students critically analyze ideas; students are encouraged to become active learners rather than passive recipients of information; and students take responsibility for their own thinking and learning (Kruse, 1988; Halpern, 1987; Lindsey, 1988).

Verbal interaction has always been an important way by which people learn (Stanford & Roark, 1974; Palmerton, 1993). Adolescents are able to develop higher order thinking skills (formal operations) through internalizing the viewpoints of other people, which takes place during dialogues with others (Barnes, & Todd, 1977). Vygotsky (1978) explains that the process of making sense of the world is profoundly influenced by one's interactions with and perceptions of one's environment. Speech functions as a means by which people construct and reconstruct their views of the world. He also explains that a central feature of the psychological study of instruction is the potential the students have to raise themselves to a higher intellectual level of development through collaboration.

Overt discussion is sound practice for learning. Students elaborate, rehearse, and personalize information. "Teachers who move classes beyond a recitation–mode into discussion promote learning because they encourage students to use dialogue as a tool to enhance thinking and understanding" (Maryland State Department of Education, 1990, p. 25). Further research indicates that complex skills and difficult material can be learned in shorter times if the learner verbalizes the information. Discussion helps develop critical thinking because students do the thinking and there is an opportunity for them to check their thinking against each other (Smith, 1990; Hill, 1990; Vermette, 1988).

In summary, features of classroom activities that enhance critical thinking include active student participation, meaningful interaction with material, and student–to–student verbal interaction. In addition, Dixson (1991) explains that in order for critical thinking skills to be enhanced, teaching methods should allow for (a) differences in learning styles and abilities, (b) interaction with the process, and (c) human interaction to help clarify thoughts and ideas.

There are many oral communication activities advocated by OCXC programs that include these features. Ruggiero (1988) suggests presenting timely or timeless challenges in the form of dialogues for student analysis, using case studies, having students build on insights, having students think aloud while solving problems, making students responsible for developing and posing questions about the lessons in the course, and involving students in the search for interesting problems and issues for class discussion and thinking exercises. Halpern (1987) and Lindsey (1988) encourage educators to allow students to teach each other. "The effort involved in teaching is similar to the effort required in learning. All teachers have probably had the experience of never really understanding a topic until they have taught it. The same is true for students" (p. 71). Knowing facts is just a start. Students need to know how to apply them, when to question them, and how to relate them to other topics. Others advocate debate, interviews, presentations and the like.

Facilitating Critical Thinking through Group Discussion Activities

Walter and Scott (1966) define discussion as "the effort of a group of individuals who talk informally together in order to solve commonly recognized problems or to arrive at an understanding of values" (p. 186). Good discussion is difficult because participants not only develop their own line of thought, but they must also respond to those developed by other group members (p. 195). In group discussion, participants are active, not passive spectators. Participants state their viewpoint, hear it criticized, defend the view, and may modify it. Students restructure their knowledge when engaged in small group discussion, affecting their learning positively. Group discussion appears to "activate" prior knowledge, mobilizing existing knowledge and restructuring this knowledge by creating new relations between concepts in ways that make sense to the persons who produce the relations. Discussion whets the appetite for more serious and purposeful reading than would be likely otherwise. When information is put to use in discussion, it is not soon forgotten. "Discussion clarifies, as well as enriches the participants' thinking" (Utterback, 1964, p. 6). Small group discussion, therefore, seems to be one way that students can better learn things that they do not relate to, or that are incompatible with existing beliefs. Discussion helps learners become aware of their own perspectives (Schmidt, De Volder, De Grave, Jonst, and Patel, 1989; Dixson, 1991).

Vansickle and Hoge (1991) maintain that students should be organized into cooperative groups to coordinate their intellectual resources and partially compensate for their limited individual informational capacities. They contend that students who work in well structured, small groups are likely to present problems more effectively, identify more potential solutions, and evaluate those solutions more thoroughly. Several students working on a problem together are less likely to lose track of important factors than individuals working alone.

Green and Klug (1990) had small groups of students collaborate in preparing library research papers. By collaborating, students became more responsible for their own learning and taught one another, improving their thinking skills. They found that students learned more effectively when working cooperatively than when studying alone. Breaking a class into small groups provides more opportunities for students to interact with each other, think out loud, and see how other students' thinking processes operate–all of which are essential elements in developing new modes of critical thinking (Meyers, 1986).

Given the apparent correlation between participation in group discussion and critical thinking, this study seeks to provide empirical evidence that participation in group discussion develops critical thinking skills more so than traditional lecture methods of instruction. Research on the facilitation of critical thinking through group discussion is sparse, however. Yet, in educational literature, there is substantial research on the effects of several group methods on learning. One widely used and empirically supported method is cooperative learning (Dixson, 1994). Cooperative learning closely parallels traditional notions of group discussion because individuals engage in discussion to enhance understanding through verbalization of their own ideas and response to the ideas of others.

Cooperative Learning as a Form of Group Discussion

Cooperative learning is defined as any classroom learning situation in which students of all levels of performance work together in groups toward a common goal.

Students are assigned to small groups to learn material and are involved in negotiating, initiating, planning, and evaluating together. They are given the responsibility of creating a "learning community" where all students participate in significant and meaningful ways. Students group together and accomplish significant tasks, and more than likely attain higher achievement levels (Johnson, Johnson, Holubec, & Roy, 1984; Maryland State Department of Education, 1990).

Slavin (1987) and Fogarty (1990) identify various cooperative learning strategies, most of which rely on group discussion as a means of facilitating critical thinking about course content. Examples include student team learning (STL), Student Team Achievement Divisions (STAD), Teams–Games–Tournaments (TGT), Jigsaw, Learning Together (LT), Group Investigation (GI), Think/Pair/Share, and Tell/Retell to name a few.

Benefits of Cooperative Learning

Cooperative learning strategies have numerous benefits. First, they give the participants a chance to learn new information from other students. Research on students' behavior within cooperative learning groups shows that students who gain most from cooperative work are those who give and receive elaborated explanations (Slavin, 1987). Effective learning occurs because students are "actively involved in organizing and finding relationships in the information they encounter rather than being the passive recipients of teacher-delivered bodies of knowledge" (Eggen & Kauchak, 1988, p. 1).

Second, students consolidate their own learning because verbalizing an idea or concept helps to fix it in their memory and to integrate it with other concepts. Cooperative learning strategies encourage oral repetition of information, including explaining, integrating, and providing rationales, which promotes long term retention of information (Johnson, et al., 1984). This was suggested by Bane (1925) who found that lecture and group discussion methods appeared equally effective in the immediate recall of material, whereas class discussion was more effective than lecture in delayed recall of information. Third, the process of discussing an idea helps the students sharpen their own opinions and clarify their own points of view. Students can test the validity of their ideas through the reactions of others (Stanford & Roark, 1974).

Finally, cooperative learning enhances achievement in the classroom. Slavin (1987) reviewed 63 studies measuring academic achievement. Of those studies, 36 (57%) found significantly greater achievement in classes that utilized cooperative learning techniques; 26 (41%) found no significant difference; and only one control group outperformed the experimental group. Students learn from one another because in their discussions of the content, cognitive conflicts will arise, inadequate reasoning will be exposed, and higher quality understanding will occur. If information is to be retained in the memory and related to information already in the memory, the learner must engage in some sort of cognitive restructuring, or elaboration of the material (Slavin, 1990). One of the most effective means of elaboration is explaining the information to someone else.

In summary, "teachers who employ cooperative learning methods promote learning because these collaborative experiences engage students in an interactive approach to processing information, resulting in greater retention of subject matter, improved attitudes toward learning, and enhanced interpersonal relations among

group members (Maryland State Department of Education, 1990, p. 11). It stands to reason then, that cooperative learning strategies would also have positive effects on developing critical thinking skills.

Cooperative Learning and Critical Thinking

Numerous scholars support the notion that cooperative learning increases critical thinking ability and competencies, and promotes increased use of higher order thinking skills and higher reasoning strategies (Vermette, 1988; Johnson and Johnson, 1982; Johnson, Maruyana, Johnson, Nelson, and Skon, 1981; Utterback, 1964; Johnson, et al., 1984). According to Davis (1992), "The extensive empirical evidence that cooperative learning enhances skill learning for a wide range of skills gives good reason to believe that this enhancement will extend to the skills of critical thinking" (p. 135).

According to Johnson and Johnson in 1986, as cited by Smith (1989), "there is conclusive evidence that cooperative teams achieve at higher levels of thought and retain information longer than students who work quietly as individuals" (p. 76). This kind of shared learning, therefore, gives students an opportunity to engage in discussion, take responsibility for their own learning, and thus become critical thinkers. All of this happens as students apply information to other settings, develop problem–solving skills, and learn to take another person's perspective.

In summary, cooperative learning, much like group discussion, promotes critical thinking because: (a) Human interaction is required; (b) students interact with material through discussion with peers; (c) students are able to view things from multiple perspectives (Dixson, 1991); and (d) group members are provided with the opportunity to identify and remedy errors of individual judgment. (Hirokawa, 1990).

Given this information, it seems advantageous to compare the effects of lecture and group discussion methods of teaching on critical thinking. This study attempts to determine if there is any significant difference between lecture and group discussion methods in the development of critical thinking skills.

METHOD

Sample

The participants (n = 118) were undergraduate students enrolled in the introductory interpersonal communication course at a medium-sized university. Students participated in the study as part of the scheduled curriculum during regular class hours.

Experimental Design

To maximize the ecological validity, the research was conducted in the natural setting of the classroom as part of the normal routine of class. To maximize the internal validity, the independent variable was manipulated and classes were randomly assigned to each condition.

Six intact classes, four that met twice weekly for 80 minutes and two that met once a week for 160 minutes, served as the experimental conditions. On the first day of class for the four classes that met twice weekly, students were assigned a textbook reading in preparation for the next class period. For the two classes that met weekly, the experiment was conducted during the last half of the first class meeting.

The experimental manipulation involved three classes being exposed to a lecture

presentation and three classes being exposed to a group discussion as a means of learning course content. The concepts covered in each class dealt with interpersonal and impersonal communication, the transactional model of communication, and characteristics of competent communicators.

Two instructors were involved in the study; one taught the three lecture classes and the other taught the three classes using the group discussion instructional method. Each instructor had ten years of teaching experience and had taught multiple sections of this introductory interpersonal communication course each quarter. Students in the lecture classes were given a thirty-minute lecture on the first chapter of the textbook by the instructor. The instructor was told what general areas to cover in the lecture, but had no knowledge of specific test items. Each lecture was videotaped.

Students in the group discussion classes were organized into groups of 4–6 people, and were given a list of questions that required them to talk about the same concepts that were covered in the lecture classes. Each group discussed the questions (which were audiotaped), and then wrote a group response to each question that was submitted to the instructor at the end of thirty minutes. The following is an example of a question used in the group discussion conditions:

> Discuss the similarities and differences between the linear, interactive, and transactional models of communication. Pay particular attention to the components of each model and what they represent. Which model most accurately represents the human communication process? Give at least three justifications for your answer.

Manipulation checks were made for both teaching strategies. Two university faculty members were given a checklist of concepts that should have been covered in both instructional methods. They filled out the checklists as they watched videotapes of the lecture and listened to audiotapes of the group discussions. The checklist included such items as the components of the transactional model of communication (communicators, encoding, decoding, noise, message, channels, feedback, and context) and distinguishing features of the model (simultaneous sending and receiving, process *with* another person, and non-discrete nature). Videotapes of each lecture revealed that the instructor did most of the talking and covered the pertinent information in each condition. The lecture information was consistent with the information being discussed in the group situations. Manipulation checks of the group discussion audiotapes and written responses revealed that, while concepts were discussed at varying levels of depth, each group covered the pertinent information.

To determine the effectiveness of the instructional method with regard to learning, students completed an objective-type test (true-false, multiple choice, and matching items) after exposure to the experimental manipulation of lecture or group discussion. This posttest measured the dependent variable of material learned based on what had been presented in the lecture and what should have been talked about in response to the questions during the group discussions. Two of the classes (one lecture and one group discussion) also completed a pretest prior to the experimental manipulation. This full field experiment thus had the following six conditions to which intact classes were assigned:

- Condition 1 ($n = 23$): Read chapter 1 prior to the class session (Pretest, Lecture presentation, Posttest)

- Condition 2 ($n = 24$): Read chapter 1 prior to the class session (Pretest, Group discussion questions, Posttest)
- Condition 3 ($n = 23$): Read chapter 1 prior to the class session (Lecture presentation, Posttest)
- Condition 4 ($n = 13$): Read chapter 1 prior to the class session (Group discussion questions, Posttest)
- Condition 5 ($n = 17$): Lecture presentation (Posttest)
- Condition 6 ($n = 18$): Group discussion questions (Posttest)

Measurement of Dependent Variable

To test the degree to which students learned the material presented via each instructional method, numerous test questions were first compiled, and eight coders then independently classified each question as requiring either higher-order thinking skills or lower-order thinking skills, as identified in Bloom's (1974) Taxonomy of Educational Objectives. Coders were students enrolled in a senior–level course on methods of teaching speech in the secondary school. In preparation for the coding, students studied Bloom's taxonomy as part of the course material in the class. They then attended a 3–hour formal training session where each level of the taxonomy, as well as sample questions exemplifying each component of the taxonomy, were discussed in detail. Coders identified questions that asked for the same content information. Only those questions identified as testing the same cognitive levels and testing the same information by at least seven of the eight coders (a minimum reliability of .88) were chosen for a preliminary test. These questions were compiled into three primary objective tests. Each test was then given to nine (of 27) students enrolled in another introductory interpersonal communication course. If eight of the nine students (representing .89 reliability) answered the "like" questions consistently (that is, if they got the first one correct, they would get the second one correct; and if they missed the first one, they would likely miss the second one), these were selected for use in the pretest and posttest for this study.

Lower-level questions focused on knowledge, comprehension, and/or application of the material covered in the lecture or group discussion conditions. An example of a true–false question that tests comprehension of basic principles of interpersonal communication is: "True or False: Interpersonal communication follows standardized rules for behavior." An example of a multiple-choice question that asks students to identify three types of noise that can block communication is:

> "The three types of noise that can block communication are:" (a) Loud, moderate, and soft; (b) mass communicational, personal, and transactional; (c) external, physiological, and psychological; (d) sociological, psychological, and communicational; or (e) linear, interactional, and transactional.

Since both of these questions focus on knowledge and comprehension, they were coded as lower–level thinking items.

Questions requiring higher–level thinking skills focused on analysis, synthesis, and/or evaluation of the material covered in the lecture or group discussion conditions. An example of a true–false question that requires students to differentiate between impersonal and interpersonal communication is: "True or False: The major difference between impersonal and interpersonal communication is the quality of interaction between the individuals." An example of a multiple-choice question that

requires students to analyze a situation and determine the best way to be a competent communicator is:

> "You want to express your appreciation to your supervisor in a way that doesn't cause either of you to feel uncomfortable. If you were a competent communicator, you would:"
>
> (a) React in the way that first occurred to you; (b) choose the most appropriate behavior after considering the context of the situation, your communication goal, and the other person; (c) proceed with the same approaches you have successfully utilized in the past; (d) emulate the behaviors you read about in your textbook; or (e) none of the above.

RESULTS

Three comparisons were made to test the differences between the instructional methods of lecture and group discussion. The first comparison tested the differences between instructional methods with regard to the total number of correct items on the posttest (14 possible). In order to rule out the potential confounding effects on the posttest of reading the chapter prior to taking the posttest (Conditions 1–4) and/or taking a pretest (Conditions 1 and 2), a 2 × 3 ANOVA was conducted, using the two types of instructional methods (lecture and group discussion) as the first independent variable and the three conditions (reading chapter/pretest/posttest, reading chapter/posttest, and posttest only) as the second independent variable. This analysis yielded nonsignificant main effects for instructional method $F(1, 112) = .03$, and condition, $F(2, 112) = .36$, as well as for the interaction effect of instructional method by condition $F(2, 112) = 1.07$ (see Table 1 for means and standard deviations).

The second comparison tested the differences between the two instructional methods with regard to the total number of questions answered correctly for items that measured higher–order thinking skills (6 possible). A 2 × 3 ANOVA was conducted, using the same variables described above, in order to rule out potential confounding effects due to the different conditions. This analysis yielded nonsignificant main effects for instructional method $F(1, 112) = .64$ and condition $F(2, 112) = 1.22$, as well as for the interaction effect of instructional method by condition $F(2, 112) = .94$ (see Table 2 for means and standard deviations).

The third comparison tested the differences between the two instructional methods with regard to the total number of questions answered correctly that tested the lower–order thinking skills (8 possible). A 2 × 3 ANOVA was conducted, using the same variables described above in order to rule out potential confounding effects of the conditions. This analysis yielded nonsignificant main effects for instructional method $F(1, 112) = .79$, and condition, $F(1, 112) = .81$, as well as for the interaction

TABLE 1

MEANS AND STANDARD DEVIATIONS FOR TOTAL SCORE

	Reading/ Pretest/ Posttest	Reading/ Posttest	Posttest Only	Overall
Lecture	$M = 11.00$	$M = 10.01$	$M = 11.06$	$M = 11.02$
	$SD = 1.90$	$SD = 3.26$	$SD = 1.25$	$SD = 1.68$
	$(n = 23)$	$(n = 23)$	$(n = 17)$	$(n = 63)$
Group	$M = 10.54$	$M = 11.08$	$M = 10.72$	$M = 10.75$
	$SD = 2.28$	$SD = 2.10$	$SD = 2.05$	$SD = 2.15$
	$(n = 24)$	$(n = 13)$	$(n = 18)$	$(n = 55)$
Overall	$M = 10.77$	$M = 11.03$	$M = 10.91$	$M = 10.81$
	$SD = 2.08$	$SD = 1.91$	$SD = 1.72$	$SD = 2.04$
	$(n = 47)$	$(n = 36)$	$(n = 35)$	$(n = 118)$

TABLE 2

MEANS AND STANDARD DEVIATIONS FOR HIGHER–LEVEL ITEMS

	Reading/ Pretest/ Posttest	Reading/ Posttest	Posttest Only	Overall
Lecture	$M = 4.70$	$M = 5.0$	$M = 4.94$	$M = 4.86$
	$SD = 1.15$	$SD = .85$	$SD = .66$	$SD = .93$
	$(n = 23)$	$(n = 23)$	$(n = 17)$	$(n = 63)$
Group	$M = 4.58$	$M = 4.92$	$M = 4.78$	$M = 4.78$
	$SD = .97$	$SD = 1.12$	$SD = 1.00$	$SD = 1.01$
	$(n = 24)$	$(n = 13)$	$(n = 18)$	$(n = 55)$
Overall	$M = 4.62$	$M = 4.97$	$M = 4.85$	$M = 4.81$
	$SD = 1.05$	$SD = .94$	$SD = .85$	$SD = .97$
	$(n = 47)$	$(n = 36)$	$(n = 35)$	$(n = 118)$

effect of instructional method by condition $F(1, 112) = .81$ (see Table 3 for means and standard deviations).

Given that there were no significant main effects for conditions or interaction effects (thereby ruling out potential confounding variables due to reading/pretest and/or taking the pretest on the posttest scores), comparisons were made between the lecture and discussion conditions in which the pretest and posttest were completed to determine whether instructional methods had increases from pretest to posttest for all comparisons. Four of the comparisons yielded significant differences; specifically, the lecture condition produced significantly more learning with regard to total score, lower–level items, and higher–level items, whereas group discussion produced significantly more learning with regard to higher–level items.

DISCUSSION

This study investigated differences between lecture and group discussion instructional methods with regard to the facilitation of critical thinking. Given the prevalence of participation in groups in professional and personal life, and the corresponding recent emphasis on active learning in education, specifically cooperative learning in groups, it is important to assess the effects of group discussion as a pedagogical strategy in comparison to more traditional methods such as lecture.

While the research reviewed earlier in this essay suggested that group discussion should be more effective than the lecture method in facilitating the use of critical thinking skills, this study did not find that these two instructional teaching strategies differentially impacted learning. There may be several reasons that explain why the findings from this study are not in line with previous research.

TABLE 3

MEANS AND STANDARD DEVIATIONS FOR LOWER–LEVEL ITEMS

	Reading/ Pretest/ Posttest	Reading/ Posttest	Posttest Only	Overall
Lecture	$M = 6.35$	$M = 6.00$	$M = 6.12$	$M = 6.15$
	$SD = 1.03$	$SD = 1.35$	$SD = .93$	$SD = 1.12$
	$(n = 23)$	$(n = 23)$	$(n = 17)$	$(n = 63)$
Group	$M = 5.96$	$M = 6.15$	$M = 5.94$	$M = 4.78$
	$SD = 1.55$	$SD = 1.45$	$SD = 1.26$	$SD = 1.01$
	$(n = 24)$	$(n = 13)$	$(n = 18)$	$(n = 55)$
Overall	$M = 6.11$	$M = 6.06$	$M = 6.03$	$M = 6.08$
	$SD = 1.29$	$SD = 1.37$	$SD = 1.10$	$SD = 1.26$
	$(n = 47)$	$(n = 36)$	$(n = 35)$	$(n = 118)$

TABLE 4

COMPARISON OF PRETEST-POSTTEST SCORES FOR LECTURE AND GROUP DISCUSSION CONDITIONS

	Total Pretest Score	Total Posttest Score	t-value	df	2-tail prob.
Lecture	$M = 9.52$	$M = 10.74$			
	$SD = 2.45$	$SD = 2.28$	−2.98	22	<.01
Group	$M = 9.83$	$M = 10.56$			
	$SD = 2.06$	$SD = 2.45$	−1.52	22	ns
	Lower–Level Pretest Score	Lower–Level Posttest Score	t-value	df	2-tail prob.
Lecture	$M = 5.43$	$M = 6.26$			
	$SD = 1.56$	$SD = 1.39$	−2.77	22	<.02
Group	$M = 6.09$	$M = 6.35$			
	$SD = 1.28$	$SD = 1.03$	−.87	22	ns
	Higher–Level Pretest Score	Higher–Level Posttest Score	t-value	df	2-tail prob.
Lecture	$M = 4.09$	$M = 4.65$			
	$SD = 1.20$	$SD = 1.03$	−2.24	22	<.05
Group	$M = 3.65$	$M = 4.61$			
	$SD = 1.03$	$SD = 1.16$	−3.31	22	<.01

First, the lecture method of instruction is still the dominant method of instruction in college classrooms, whereas student experience with group discussion is not as common. Students are familiar with learning material for "objective" tests from lectures, but may not be as accustomed to learning such material in group discussions. Given that this was an introductory course attended primarily by freshmen and sophomores, it is doubtful how much instruction and/or experience students have had working in groups and using group discussion procedures. Moreover, this study was conducted on the first day of class, so students had not had any opportunities to work in groups in these classes. This lack of experience in group discussion may well account for these findings. Future research needs to investigate whether prior training and/or experience with group discussion techniques, in comparison to no training, facilitate the utilization of critical thinking skills.

Second, most scholars and educators agree that in order to maximize the potential learning benefits that can be obtained from group work, a group's discussion processes need to be structured (Hirokawa, 1993). The group discussions in this study, however, were fairly informal, with few constraints. A more structured group experience might well show significant differences in learning outcomes when compared to the traditional lecture method. Partial support for this point is found in the literature for team learning, a highly structured group discussion cooperative learning strategy. Although critical thinking is not identified specifically as a learning outcome in this literature, scholars postulate that because achievement increases in teams, critical thinking also increases (see Michaelsen, 1992; Michaelsen, Jones, & Watson, 1994). Future research should investigate the differential effects of various group discussion formats with regard to developing critical thinking skills.

Given the possible lack of experience with group discussion in general, the specific lack of experience with groups in this particular class, and the relatively unstructured group discussions that occurred, it is quite remarkable that the group discussion method did not produce significantly less learning than the lecture method. The lack of significant difference in this particular case shows much promise for the potential benefits of group discussion as an instructional technique.

Third, rote memory could also be a factor in explaining these results. The lowest

level of Bloom's taxonomy–knowledge–is often accomplished through rote memorization. Hence, if students had memorized items of information and remembered them correctly during the posttests, there would be a positive impact on the lower–level items and possibly the higher–level items if students were able to move beyond rote memorization. Conversely, if students didn't memorize the information, it could have a negative impact on both levels.

Fourth, this study is based on a limited sample size in one course. The use of a more extensive sample might produce some differences between lecture and group discussion methods, especially in classes where group discussion is an ongoing part of coursework. It would be expected, for example, that group discussion would contribute significantly to learning material in a small group communication class. A larger sample that uses multiple courses, conducted preferably at multiple institutions, might reveal some interesting differences.

The lack of significant differences between the lecture and group discussion method should not obscure what is perhaps the most important finding from this study: Both instructional methods yielded significantly more gains in learning than did reading a chapter and receiving no instruction at all. Lecture significantly improved all of the posttest scores–the total score, the lower–level score, and the higher–level score–while group discussion significantly improved scores for the higher–level score. Interestingly, the average gain in the lecture condition was .56 for the higher–level items and .83 for the lower–level items, while the average gain in the group discussion condition was .96 for the higher–level items and .26 (nonsignificant) for the lower–level items. These findings are more consistent with expectations suggested by previous research. That is, the change in scores is in the expected direction with group discussion being better than lecture for facilitating the use of higher–level critical thinking skills, while the reverse is true for lower–level critical thinking skills.

The instructional strategies of lecture and group discussion employed in this study both involve face–to–face communication with others. Given that the potential confounding effects of reading per se and/or taking a pretest were ruled out when analyzing data, the findings show that both of these instructional methods had significant effects on learning critical thinking skills when compared with no instruction (the pretest score). In an age of correspondence courses, electronic classrooms, and budgetary cutbacks that result in downsizing and faculty reductions, it may be tempting to dismiss the value of face–to–face teaching in favor of alternatives. The results from this study suggest that we need to think very seriously before proceeding down that path if our goal is to facilitate student learning.

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